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failures of grocery stores; in 1916, 3,599; in 1917, 3,129; in 1918, 1,969; and in 1919, 1,359. For each year these failures comprised approximately one-third of the total mercantile failures in the country.

ISADOR LUBIN

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Statistics and Their Application to Commerce. By A. Lester Boddington. London: H. Foulks Lynch & Company. 1921. xv, 220 pp.

Boddington's book on statistics and their application to commerce is the first attempt on the part of an Englishman, as far as the reviewer knows, to apply simple statistical methods to business, or more particularly to commerce.

The author in the Introduction reviews briefly the recent changes affecting business, and points out the need for the business man of today to study his problems scientifically. He regards business as a science, and the business office, therefore, as a laboratory in which much of the quantitative data growing out of business transactions may be used not only to test the results of past action, but also to indicate the future results of present business policies.

Regarding the application of statistics to business and the objects of statistics, the author comments as follows: "One of the objects of statistics is to supply a panoramic view of a large mass of facts accumulated from past experience, to coördinate and condense these facts into a form easily comprehensible to the man in the street, and to use the knowledge so obtained to assist present or future operations. If this definition of the object be admitted, then the usefulness of statistics to commerce cannot be questioned."

The volume is divided into two parts. Part I covers the Compilation of Statistical Data, and Part II, the Presentation and Uses of Statistical Data. Under Part I the author discusses "Business Statistics and Their Importance," "Compilation and Uses of Statistics," "Accuracy and Approximation," and "Types and Averages." Under Part II, the chapter headings are as follows: "Tabulation," "The Graphic Method," "The Graphic Method Applied to Commerce," "Index Numbers," and "Published Statistics and Their Use." It will be noted that the main topics found in current books on statistics are included. The only thing which impresses the reviewer as out of the ordinary is the treatment of tabulation after the discussion of types and averages. Concerning this order more is said later. A distinctive feature of the make-up of the volume is the inclusion of a synopsis in each chapter. This arrangement has certain advantages and might well be followed generally.

The book contains both tabular and graphic material designed to illustrate the various applications which the author makes of the principles discussed.

The emphasis given to the importance of units throughout the discussion is gratifying, the contention of the author being that little or no progress can be made in applying statistics to business or in interpreting current statistical data without full cognizance being taken of the units which are employed.

The volume has certain limitations, but attention is called to them without any desire to detract from the general value of the volume for the purpose for which it is written.

In the discussion of averages, the author seems to have misconceived the meaning of the arithmetic mean, and to have confused the arithmetic average and the weighted arithmetic average. On page 59 the author states: "A works employs three foremen at a wage of £20 per week each, and 120 workmen whose average wage is £1 per week. What is the average wage?

If we use the simple arithmetic average, we get:

$$\frac{£20+£1}{2}=\frac{£21}{2}=£10.5,$$

a result which is obviously misleading." To call the result of such a calculation as this a simple arithmetic average is to do precisely what the author tells us, in a similar example on page 56, ought not to be done. In the matter quoted immediately above, to multiply, as the author advises, £20 by 3 and £1 by 120 and to divide the result by 123 does not, in the reviewer's judgment, as the author states on page 60, result in securing a weighted average. Such a calculation as that resulting from adding £20 and £1 and dividing by 2 is meaningless. Merely to make the frequencies greater than unity, as may be illustrated by the following example, is not to make a simple into a weighted average:

Rate	Frequency	Product	Frequency	Product
£20	1	£20	3	£ 60
1	1	1	120	120
	2	2)£21	123	123)£180
		£10.5		£1.463

The average, £10.5, does not fulfil the conditions described in the quoted matter. Moreover, to speak of £1.463 as a weighted and £10.5 as an unweighted arithmetic average is clearly an error. Other illustrations of the confusion between the two terms are found in the chapter on types and averages.

To speak of the median, as is done on page 68, in contrast to an arithmetic average as always being an "actual case in the data" appears to be an error for all discrete series having an even number of items. Not infrequently in data of this type there are no precise medians.

In enumerating the subject matter discussed in the volume, it was noted that the discussion of tabulation follows the consideration of types and averages. Such an order of treatment makes necessary considerable repetition and is hardly in keeping with the author's statement on page 76 that "The tabulation of results is really the final stage of the work of compilation, and subsequently becomes the basis for consideration, deduction, and application to present and future problems." Averages are precisely the means by which such consideration, deduction, and application are made and, since this is true, it would seem that they should be discussed after tabulation.

In several places terms are used which are not defined. An illustration of this is found on page 102 where "continuous series" are mentioned, but not defined. Moreover, the word "data" is used in various places with a singular verb.

The volume is replete with graphic figures, but many of them are poorly drawn, particularly so far as scales are concerned. On page 132 in Table R the author has clearly violated his own injunction that in tabulation things to be compared should be placed in juxtaposition. If the table had been made in keeping with this principle, the conclusion that the monthly sales cannot be compared with the accumulated sales would not follow. It is true that graphic presentation has certain advantages over tabular presentation, but these advantages are artificially stressed in this instance by the form in which the table is designed.

The last chapter, on "Published Statistics and Their Use," refers solely to railway statistics and hardly seems to justify the broad title used.

Probably the main interest of this volume to the American student is found in the chapter on index numbers. This includes a discussion of the make-up and peculiarities of each of the main English numbers and comments concerning the commercial uses to which these index numbers may be put.

HORACE SECRIST

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The American Railroad Problem. By I. Leo Sharfman. New York: The Century Company. 1921. xiii, 474 pp.

The scope of Professor Sharfman's book is all that its name implies—*The American Railroad Problem.* It is primarily a study of the present-day railroad situation in the United States, but it does not avoid historical or economic analyses when they are essential to the reasoning or the exposition. The book is, therefore, much more than a mere study of war-time railroad operations. Indeed, it is Professor Sharfman's thesis that the problems which focused during the war can be clearly traced in the immediate pre-war years. The war situation did, however, inspire the writing of the book, and the experience of federal control is not treated merely as a separate episode. This fact is reflected by the sequence in treatment: a demonstration of the rise of the root problems, an exposition of their incidence upon war conditions, and an analysis of the proposals for their solution.

These root problems are three: "Unity of operation and railroad service; rates, credit and financial return; and railroad labor and continuity of operation." Fundamentally, all three are concerned with service. They correspond with the important additions to the regulative machinery adopted in the Transportation Act, 1920. Professor Sharfman considers each in turn, pointing out the origin of the problem, the previous attempts at solution, the reasons for failures to cope adequately with the difficulties, and finally indicating the method proposed in the Transportation Act, its limitations and possibilities. A concluding chapter discusses the experience since March, 1921. It cannot be said that Professor Sharfman is unduly sanguine that the Transportation Act has solved the railroad problem, once for all. He fully recognizes the ultimate issue. In conclusion he says: "The regulative method, as well as corporate ownership and private operation, is now undergoing its crucial test."